

Group C1.01 - EcoSaurus Engineering

Environmental Remediation of Raptor Refinery

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Project Overview

This project focuses on remediating target areas within the Raptor Refinery, including: a Solid Waste Management Unit, a plume and two areas of concern. Our team has performed an evaluation of the different remediation alternatives, a sustainability analysis, and a Life-Cycle Cost Analysis to select the best prevention plan. This plan will reduce potential exposure from contaminants found in the target areas and provide a long-term monitoring solution.

Summary of Contaminants

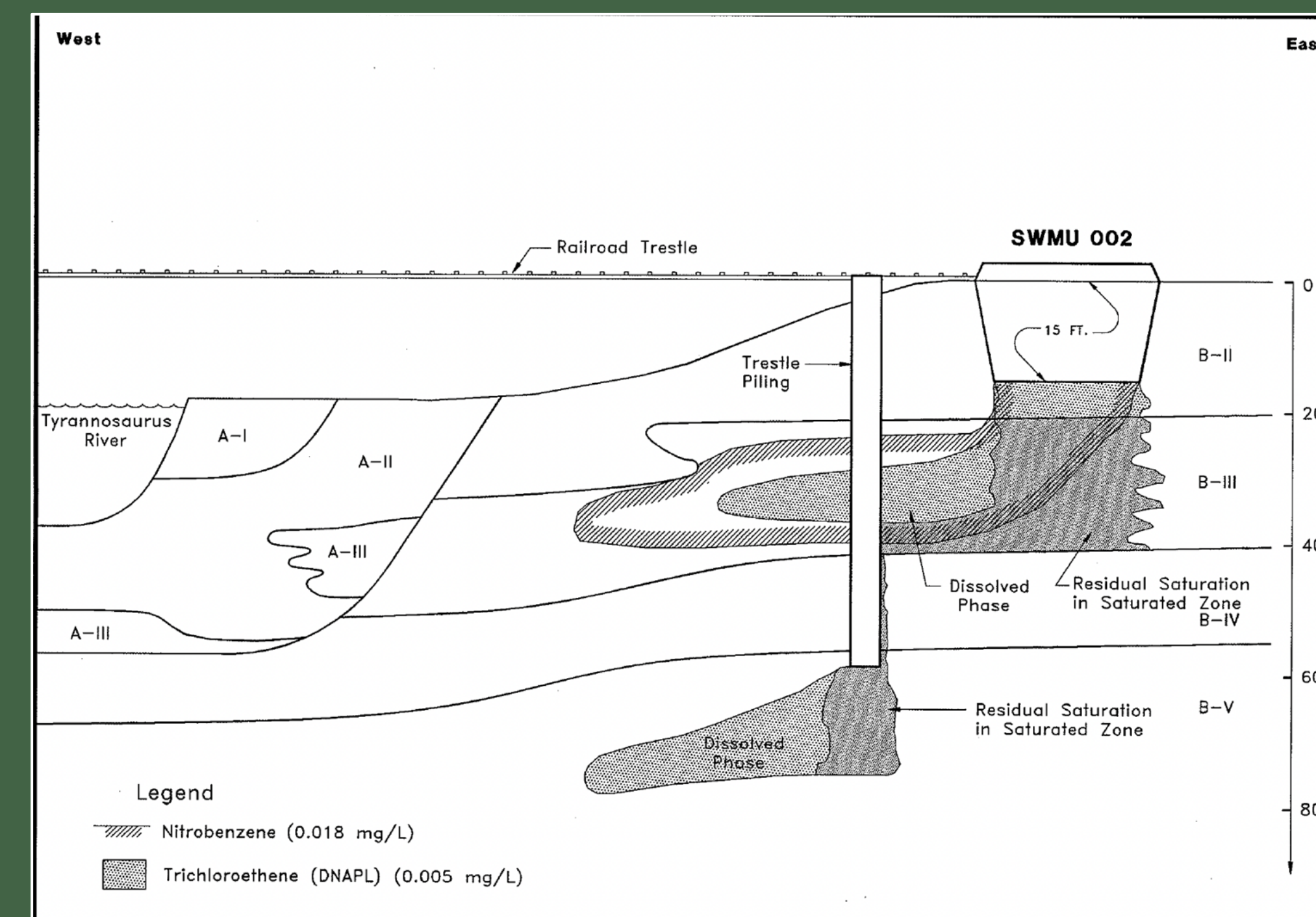
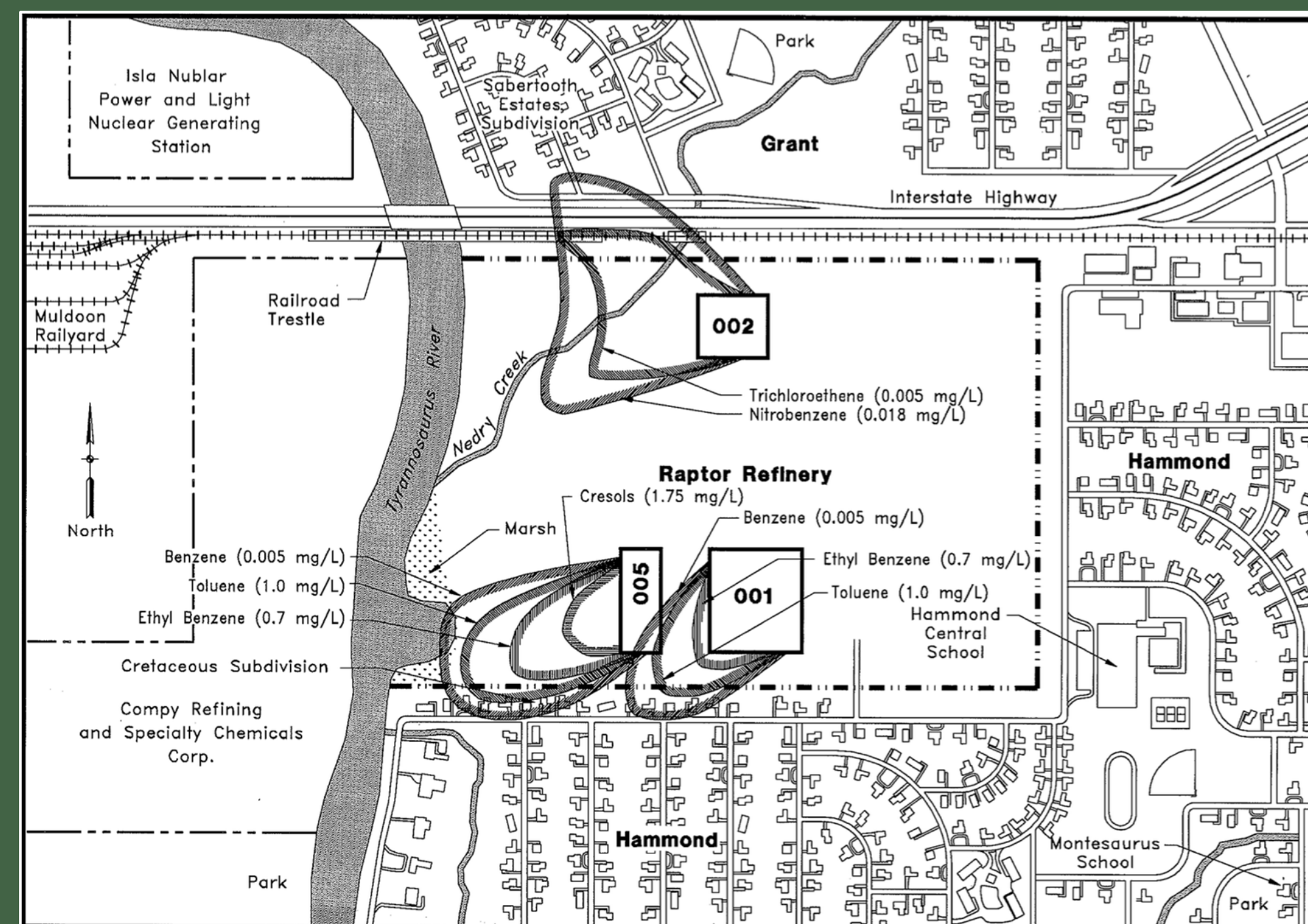
Summary of Contaminants Above Action Level

Contaminants	SWMU (mg/kg)	Plume (mg/L)	AOC 001 (mg/kg)	AOC 002 (mg/kg)
TCE	250	0.11	-	-
Lead	647	-	-	-
Nitrobenzene	-	0.15	-	-
Chromium	-	-	406	415

Remediation Standards

Environmental Protection Agency (EPA)
Texas Commission on Environmental Quality (TCEQ)
Texas Commission on Environmental Quality (TRRP)
ISI Envision

Map of Contamination



Solid Waste Management Unit 002

SWMU 002 is a landfill used for the disposal of process wastes and residues. It is the primary source of contamination causing plume 002 and AOC 001 & 002.

Areas of Concern 001 & 002

AOC 002 is a former stormwater drainage ditch located downgrade from SWMU 002. AOC 001 is a stretch of Nedry Creek where stormwater has been discharged from AOC 002, both resulting in sediment contamination.

Plume 002

Plume 002 is seepage located in the Upper and Lower Chicot Aquifer, directly caused by SWMU 002.

Alternative Methods

Alternative 1 - Source Control & Groundwater Protection	Alternative 2 - Targeted Source Reduction	Alternative 3 - In-Situ Chemical Oxidation (ISCO) + Sediment Stabilization	Alternative 4 - Engineered Source Isolation & Aquifer Protection
Components	Components	Components	Components
Landfill Cap Upgrade	Landfill Cap Upgrade	Landfill Cap Upgrade	Landfill Cap Upgrade
Excavation of AOC 1&2	Excavation of AOC 1&2	In-Situ Chemical Oxidation (ISCO)	Sediment Stabilization of AOC 1&2
Permeable Reactive Barrier (PRB)	Dual Phase Extraction (DPE) Wells	Sediment Stabilization of AOC 1&2	Deep Soil Mixing (DSM)
Monitoring Wells	Enhanced-Reductive Dechlorination (ERD) Wells	Monitoring Wells	Slurry Wall
	Monitoring Wells		Permeable Reactive Barrier (PRB)
			Monitoring Wells

Criteria Analysis

Criteria	Weights	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Reduce Exposure	10	30	30	40	50
Sustainability	8	32	32	32	24
Viability	7	28	28	28	21
Environmental Impact	6	24	24	18	12
Cost	6	24	30	12	6
Community Acceptance	4	16	12	16	12
Time	3	12	15	9	9
Total	-	163	171	155	134

Sustainability Analysis

Categories	Alt 1	Alt 2	Alt 3	Alt 4
Quality of Life	74	74	69	69
Leadership	137	143	143	143
Resource Allocation	36	42	44	44
Natural World	159	165	165	165
Climate and Resilience	97	97	92	97
Totals	503 / 66%	521 / 66%	513 / 70%	518 / 68%

➤ Envision Sustainability Program

➤ All Platinum Rankings



Cost Analysis

Alternatives	Total Capital Cost	Total Life-Cycle Cost
Alternative 1	\$97,215,000	\$139,286,000
Alternative 2	\$21,584,000	\$119,318,000
Alternative 3	\$75,530,000	\$213,003,000
Alternative 4	\$288,800,000	\$330,870,000

Meet the Team

